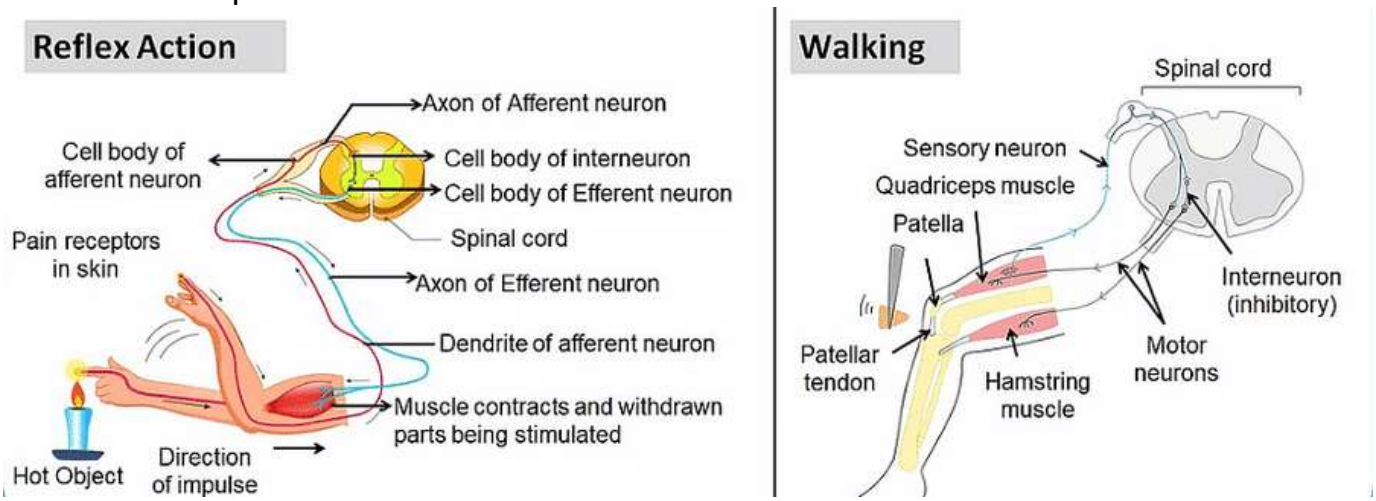
Class 10 Solutions Science Chapter 6 Control and Coordination

Page No. 105

Q1: What is the difference between a reflex action and walking?
Ans:

- **Reflex action** is the involuntary action that occurs in response to stimuli.
- They occur without the involvement of conscious areas of the brain.
- All the reflex actions are unconscious.
- Reflex action occurs brain and spinal cord of the central nervous systems.
- This kind of response occurs within a fraction of a second.

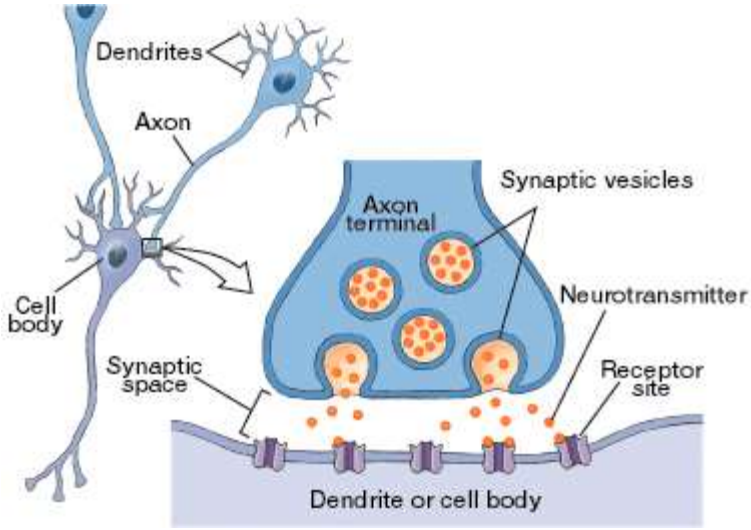


- On the other hand, voluntary actions are those which occur under the control of the cerebellum of the brain.
- **Walking** is learnt as we grow. Walking is controlled by the brain. This kind of response takes a longer time.

Q2: What happens at the synapse between two neurons?
Ans: A **synapse** is a tiny gap between the end of one neuron's axon and the dendrite of another neuron. It functions as a one-way valve for transmitting signals. Here's how it works:

- The axon of the first neuron releases **chemicals** into the synapse.
- These chemicals cross the synapse and trigger an electrical impulse in the dendrite of the next neuron.
- This process ensures that signals travel in only one direction.

This mechanism is essential for the rapid transmission of **nervous impulses** throughout the body.

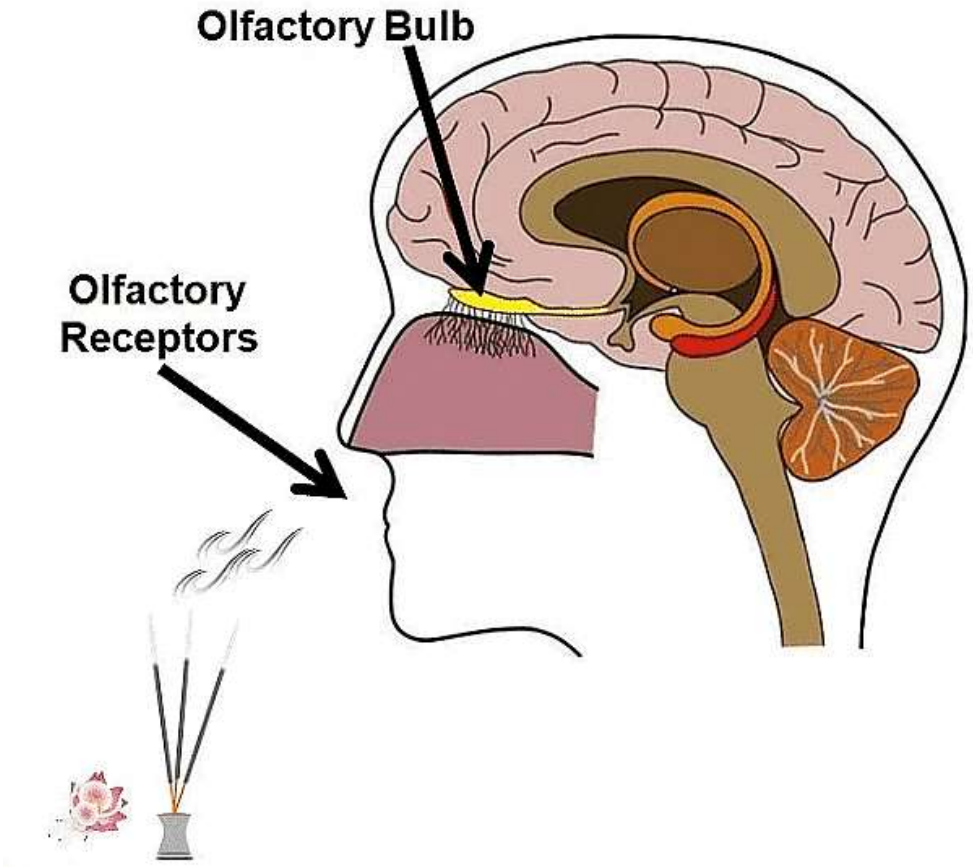


Dendrite

Q3: Which part of the brain maintains the posture and equilibrium of the body?
Ans: The **cerebellum**, located in the hindbrain, plays a crucial role in:

- **Maintaining posture** of the body.
- Ensuring **equilibrium** during movement.
- Coordinating voluntary actions for precision.

Without the cerebellum, activities like walking or riding a bicycle would be challenging.
Q4: How do we detect the smell of an *agarbatti* (incense stick)?
Ans: The thinking part of our brain is the **forebrain**. It has separate areas that are specialized for hearing, **smelling**, sight, taste, touch, etc. The fore-brain also has regions that collect information or impulses from various receptors.

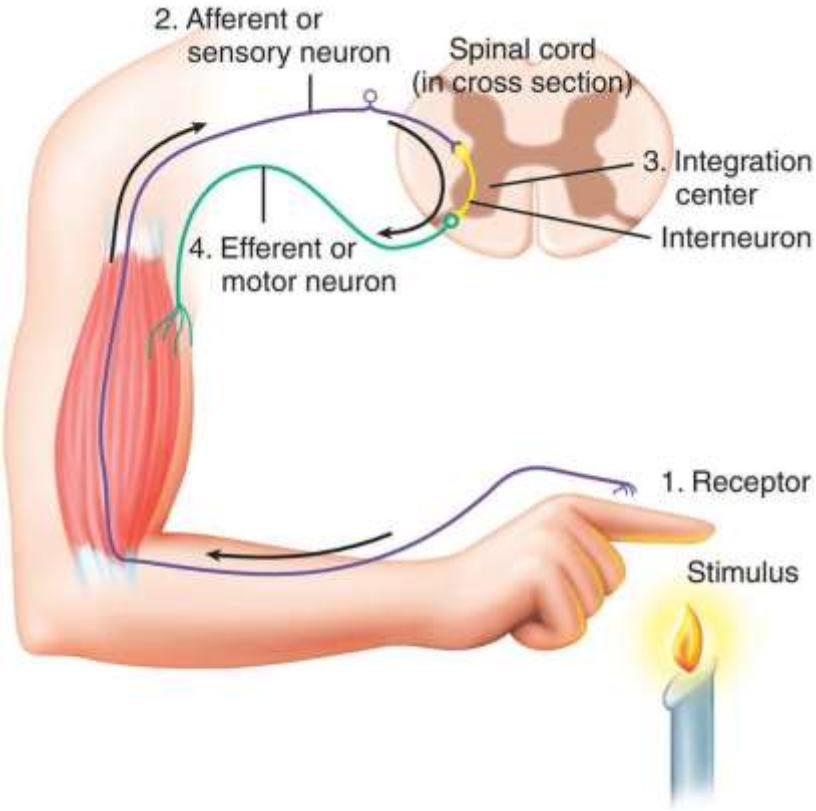


When the smell of an incense stick reaches us, our forebrain detects it. Then, the forebrain interprets it by

putting it together with the information received from other receptors and also with the information already stored in the brain.

Q5: What is the role of the brain in reflex action?
Ans:

- The brain plays minimal role in reflex actions.
- Reflex actions are quick, involuntary responses to stimuli, occurring without conscious thought.
- They are primarily controlled by the **spinal cord** through a mechanism called the **reflex arc**.
- When a stimulus (e.g., touching something hot) is detected, it is sent through **sensory nerves** to the spinal cord.
- The spinal cord processes the information and sends an immediate response through motor nerves to the muscles, causing an **automatic reaction** (e.g., pulling the hand away).
- The brain is aware of the response, but does not directly control it.
- The brain processes the sensory information after the reflex action has occurred, which is why reflex actions are so quick — the brain's conscious involvement would take longer.
- In summary, the **spinal cord** is responsible for the **quick response** (reflex), while the brain only becomes aware of it after the response has already occurred.
- Reflex arcs are formed in the spinal cord, and the information (input) reaches the brain.
- The brain is only aware of the signal and the response that has taken place.
- The brain has no role to play in the creation of the response.



Page No. 108

Q1: What are plant hormones?
Ans: Plant hormones are the fluid that are secreted within the plant also known as **phytohormones.** Plant hormones regulate the growth and development of the plant. Examples of plant hormones include:

- **Auxin** - promotes cell elongation and growth.
- **Gibberellins** - stimulate stem growth.
- **Cytokinins** - encourage cell division.

Q2: How is the movement of leaves of the sensitive plant different from the movement of a shoot towards light?
Ans:

Movement of leaves of sensitive plant	**Movement of shoot towards light**
(i) Growth independent movement. (ii) Movement is non-directional i.e., it is neither towards nor away from the stimulus. (iii) Such movements are referred to d as nastic movements. (iv) Such movements are reversible.	(I) Growth-dependent movement. (ii) Movement is towards the source of stimulus (light). So it is a directional movement. (iii) Such movements are referred d as tropic movements. (iv) Such movements are irreversible.

Q3: Give an example of a plant hormone that promotes growth.
Ans: Auxin is an example of a growth-promoting plant hormone. Auxins are responsible for cell elongation in the shoot and accelerates growth.

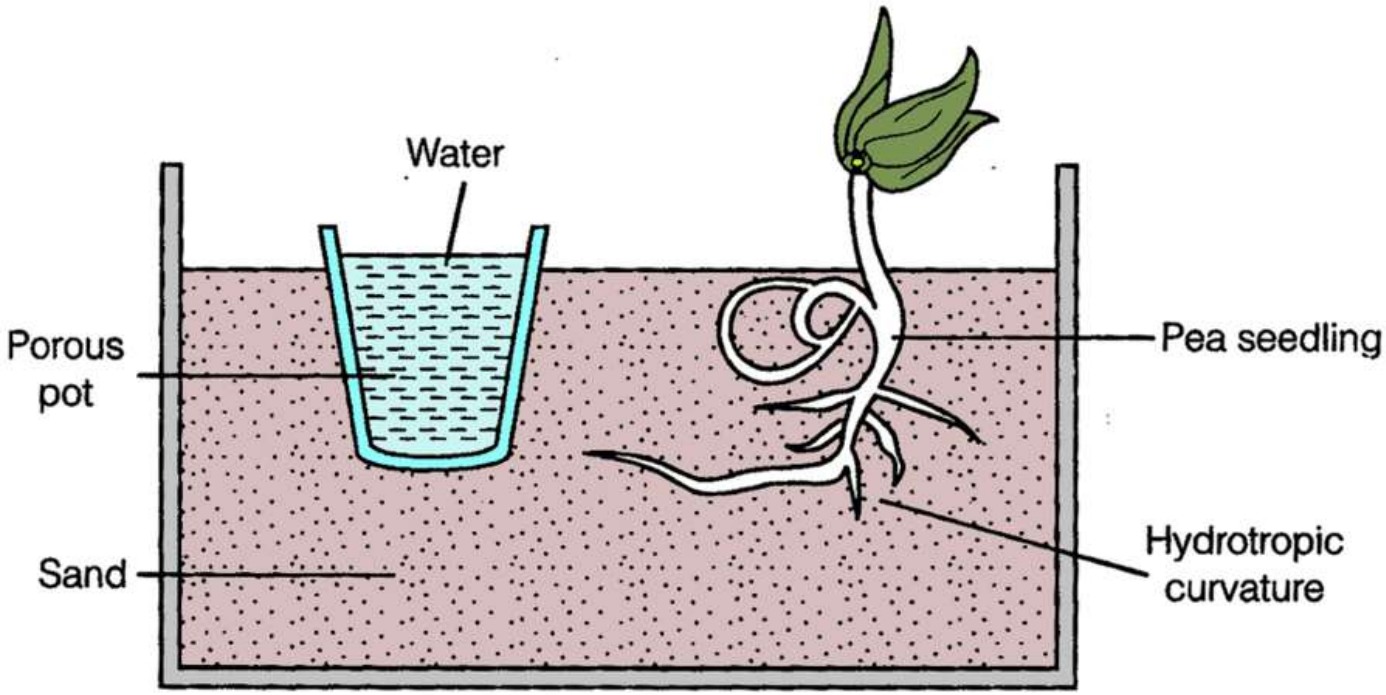
Q4: How do auxins promote the growth of a tendril around a support?
Ans: Auxins are hormones produced at the shoot tip of plants. They play a crucial role in growth, particularly in tendrils. Here's how they work:

- When a tendril touches a support, auxins promote **faster growth** on the side away from the support.
- This uneven growth causes the tendril to **coil** around the support.
- The result is a structure that resembles a **watch spring**, allowing the plant to cling effectively.

Q5: Design an experiment to demonstrate hydrotropism.
Ans: To demonstrate hydrotropism in plants.
Procedure:

- Plant a seedling in a vessel containing soil.
- Adjacent to the seedling put a porous pot containing water.
- Leave thset-upup for few days.

Observation:
On examining the roots it is observed that the roots bend towards the source of water and do not grow straight.
Result:
It confirms that the plant shows hydrotropism as the roots bend towards the porous pot of water. As hydrotropism is a plant growth response in which the direction of growth is determined by a stimulus of a gradient in water concentration.



Experiment of Hydrotropism

Page No. 111

Q1: How does chemical coordination take place in animals?
Ans: Chemical coordination in animals occurs through **hormones**, which act as chemical messengers. These hormones are:

- Secreted by **glands** in the body.
- Responsible for regulating various **physiological processes**.

This process is part of the **endocrine system**, which works alongside the **nervous system** to control and coordinate bodily functions. Key points include:

- Hormones travel from one part of the body to another to exert their effects.
- A **feedback mechanism** helps regulate hormone action.

Q2: Why is the use of iodized salt advisable?
Ans: The use of **iodized salt** is important for several reasons:

- **Iodine** is essential for the thyroid gland to produce the hormone **thyroxin**.
- Thyroxin helps regulate the metabolism of carbohydrates, fats, and proteins in the body.
- A deficiency in iodine can lead to an enlarged thyroid gland, known as **goitre**.

- Goitre is often characterised by a swollen neck.

Therefore, incorporating iodized salt into our diet supports the normal functioning of the thyroid gland.

Q3: How does our body respond when adrenaline is secreted into the blood?
Ans: Adrenalineis a hormone released by the adrenal glands during times of danger or stress. When it enters the bloodstream, it triggers several responses in the body:

- **Increased heart rate:** This helps supply more oxygen to the muscles.
- **Faster breathing:** The diaphragm and rib muscles contract more, allowing for increased oxygen intake.
- **Higher blood pressure:** This ensures that blood reaches vital organs and muscles more efficiently.
- **Blood diversion:** Blood flow to the digestive system and skin decreases, redirecting it to the skeletal muscles.

These changes prepare the body to effectively respond to stress or emergencies.

Q4: Why are some patient of diabetes treated by giving injections of insulin?
Ans: Diabetes occurs when the pancreas does not produce enough **insulin**, a hormone that regulates blood sugar levels. This leads to high blood sugar levels, which can cause various health issues. Insulin injections are given to:

- Help convert excess sugar in the blood into **glycogen**.
- Control and lower blood sugar levels effectively.
- Prevent complications associated with diabetes.

Exercise: Page No. 112
Q1. Which of the following is a plant hormone?
(a) Insulin
(b) Thyroxin
(c) Oestrogen
(d) Cytokinin
Ans: (d) Cytokinin
Cytokinin is a plant hormone whereas Insulin, Thyroxin and, Oestrogen are the hormones produced by animals.

Q2. The gap between two neurons is called a
(a) dendrite.
(b) synapse.
(c) axon.
(d) impulse.
Ans: (b) Synapse

The gap between two neurons is called a **synapse.** At the synapse, chemicals are released that help transmit signals to the next neuron.

Q3. The brain is responsible for
(a) thinking.
(b) regulating the heartbeat.
(c) balancing the body.
(d) all of the above.
Ans: (d) all of the above
The brain is responsible for **thinking, regulating the heartbeat and balancing the body.**

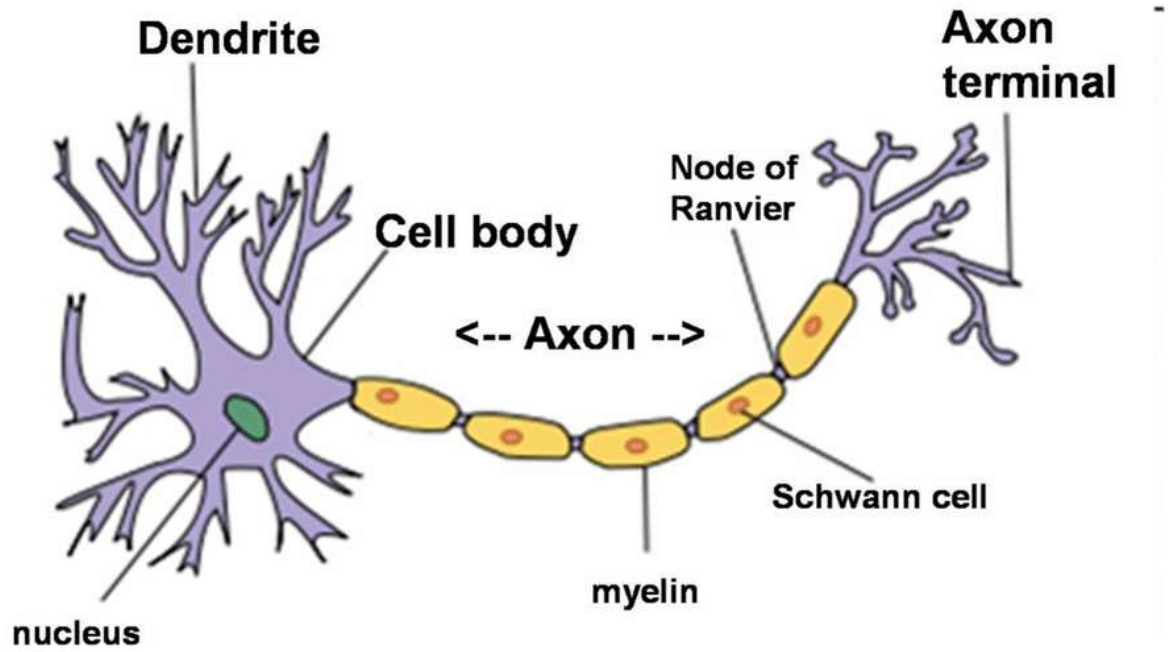
Q4. What is the function of receptors in our body? Think of situations where receptors do not work properly. What problems are likely to arise?
Ans: Receptors are **sensory structures** (organs/tissues or cells) present all over the body. The receptors are either grouped in the case of the eye or ear or scattered in the case of the skin.
Functions of receptors:

- They **sense external stimuli** such as heat or pain.
- They also **trigger an impulse** in the sensory neuron which sends a message to the spinal cord.

When receptors do not function properly, various problems can arise, including:

- Inability to feel pain, leading to injuries.
- Difficulty in sensing temperature changes, risking burns or frostbite.
- Impaired senses, such as taste and smell, affecting nutrition and safety.

Q5. Draw the structure of a neuron and explain its function.
Ans:



Structure of Neuron

Functions of the three parts of a neuron:

- **Axon:** It conducts messages away from the cell body.
- **Dendrite:** It receives information from the axon of another cell and conducts the messages towards the cell body.
- **Cell body:** It contains a nucleus, mitochondria, and other organelles. It is mainly concerned with maintenance and growth.

Q6. How does phototropism occur in plants?
Ans: The growth movement in plants in response to light stimulus is known as **phototropism**. The **shoots** show **positive phototropism** and the **roots** show **negative phototropism.** This means that the shoots bend towards the source of light whereas the roots bend away from the light source.
Some examples of phototropism are as follows:

- The **flower head of the sunflower** is positively phototropic and hence it moves from east to west along with the sun.
- The **ovary stalk of groundnut** is positively phototropic before fertilization and becomes negatively phototropic after fertilization so that the fruit is formed underground.

Q7. Which signals will get disrupted in case of a spinal cord injury?
Ans: The reflex arc connections between the input and output nerves meet in a bundle in the spinal cord. Nerves from all over the body meet in a **bundle in the spinal cord** on their way to the brain. In the event of a **spinal cord injury**, the following signals are disrupted:

- The connections in the **reflex arc** are affected, which impacts immediate responses.
- Signals from the body to the brain are interrupted, preventing sensation and feedback.
- Messages from the brain to the body are also disrupted, affecting movement and coordination.

Overall, both incoming sensory signals and outgoing motor signals are compromised.

Q8. How does chemical coordination occur in plants?
Ans: In plants, control and coordination occur through **hormones**, as they lack a nervous system. These hormones are special chemical substances that:

- Are produced in one part of the plant.
- Move to other parts where they are needed.

For example, a hormone made in the roots can be sent to other areas when necessary. There are five main types of **phytohormones**:

- **Auxins**
- **Gibberellins**
- **Cytokinins**
- **Abscisic acid**
- **Ethylene**

These hormones can be:

- **Growth promoters** (e.g., auxins, gibberellins, cytokinins, ethylene)
- **Growth inhibitors** (e.g., abscisic acid, which can cause wilting of leaves)

Q9. What is the need for a system of control and coordination in an organism?
Ans: The need for a system of **control** and **coordination**in an organism is crucial for maintaining body functions. This system allows various body systems to work together in response to changes. Key points include:

- **Coordination** ensures that movements occur in response to stimuli.
- In animals, the **nervous system** and **muscular system** provide control and coordination.
- The nervous system sends messages to and from the brain, with the spinal cord relaying these messages.
- Without this system, the body cannot function properly. For example, touching a hot object triggers an immediate withdrawal of the hand.
- If nerve transmission fails, we may not react quickly enough, leading to injuries.

Q10. How are involuntary actions and reflex actions different from each other?
Ans: Involuntary actions are actions that occur without conscious control. For example:

- We cannot consciously control the movement of food in the **alimentary canal**.
- These actions are managed by the brain.

Reflex actions, in contrast, are quick responses to stimuli that do not involve conscious thought. For instance:

- The eyes close immediately when exposed to bright light.
- These actions happen suddenly and are not under direct control of the brain.

Q11. Compare and contrast nervous and hormonal mechanisms for control and coordination in animals.
Ans:

Nervous System Mechanism	Hormonal System Mechanism
It is consist of nerve impulses between PNS, CNS and Brain.	It consists of the endocrine system which secretes hormones directly into the blood.
The axons and dendrites transmit the information through a coordinated effort.	The information is transmitted or transported through the blood.
The flow of information is rapid and the response is quick.	The information travels slowly and the response is slow.
Nerve impulses are not specific in their action.	Each hormone has specific actions.
Effects are short-lived.	It has prolonged effects.

Q12. What is the difference between the manner in which movement takes place in a sensitive plant and the movement in our legs?

Ans:

Movement in sensitive plants	Movement in our legs
The movement in a sensitive plant is a response to stimulus (touch) which is an involuntary action.	Movement in our legs is a voluntary action.
No special tissue is there for the transfer of information	A complete system CNS and PNS is there for the information exchange.
Plant cells do not have specialised protein for movements.	Animal cells have specialised protein which helps muscles to contract.